



Non-linear Multiscale Ambient Seismic Noise Tomography of Cumbre Vieja volcano, La Palma (Canary Islands).

Iván Cabrera (1), Jakub Kovacik (2), Sophie E Piggot (3), Jean Soubestre (1), Luca D'Auria (1,4), José Barrancos (1,4), German D. Padilla (1,4), Alba Martín-Lorenzo (4), Nemesio Pérez (1,4)

(1) Instituto Volcanológico de Canarias (INVOLCAN), San Cristóbal de La Laguna, Canary Islands (ivan.cabrera.beca@iter.es), (2) Department of Geoscience, University of Calgary, Calgary, Canada, (3) Department of Biological and Environmental Science, University of Hertfordshire, Hatfield, U.K., (4) Instituto Tecnológico y de Energías Renovables (ITER), Granadilla de Abona, Spain

The island of La Palma is the most occidental and volcanically active island of the Canarian archipelago. The youngest volcanic rocks are located in the Cumbre Vieja volcanic complex, a fast growing North-South ridge in the southern half of the island, which is considered to be an active rift zone. The high number of historical eruptions is an indication of the great volcanic activity of the area, that can potentially host geothermal reservoirs. The objective of this work is to perform an ambient noise tomography in this zone to image geothermal anomalies and/or magma chambers. To do so, we deployed a temporal seismic network in two phases. During the first phase that lasted one month, 12 broadband seismic stations were installed in the northern part of Cumbre Vieja. In the second phase, the 12 seismic stations were moved to the central part of the volcanic complex. Five permanent broadband seismic stations operated by INVOLCAN for volcanic monitoring are also used for this study.

After performing standard data processing to retrieve Green's functions from cross correlations of ambient noise, and retrieving dispersion curves using the FTAN (Frequency Time Analysis) technique, we performed an inversion of the data to retrieve group velocity maps.

We developed an innovative technique based in a non-linear inversion approach for obtaining the velocity maps. The method is based on a progressive increase in the resolution, exploiting the multiscale property of discrete wavelet decomposition.

We present some preliminary results on Cumbre Vieja volcano and their relevance for the purposes of geothermal exploration.